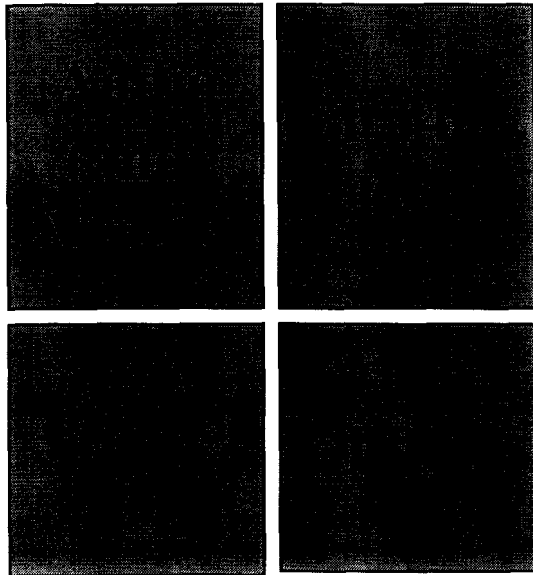


Text Telephony, a subset of Total Conversation

- IP Telephony builds on IP Multimedia technology.
- IP Text Telephony builds on IP Total Conversation technology
 - ITU-T H.323 Annex G Text Conversation and Text SET. IP telephone extension with text
 - Draft-ietf-avt-rtp-text-02.txt transport for text in IP networks
 - Usable in IETF multimedia protocol SIP

Text in IP networks

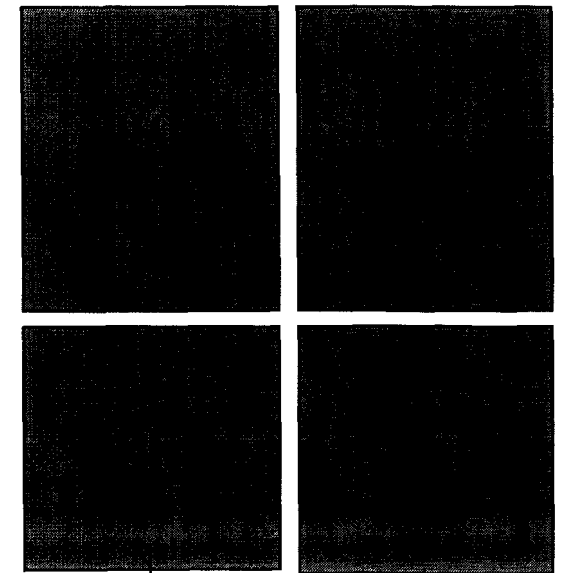
IP Textphone or
Total Conversation
terminal



- **H.323 Annex G = text in the dominating IP telephony protocol H.323**

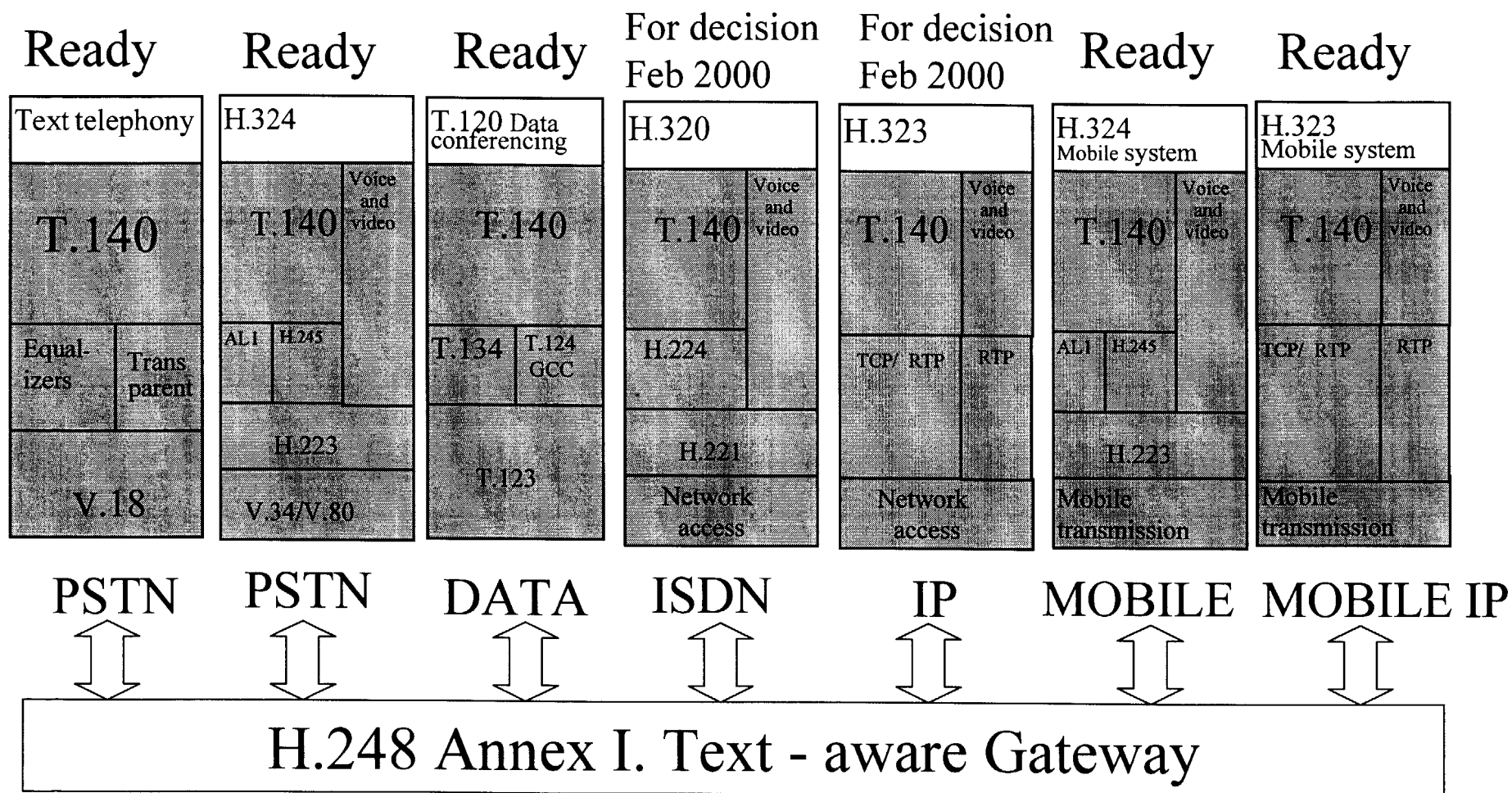
- **SIP text conversation also possible without further specification**

IP textphone



IP Network

Total Conversation - a growing family



Draft

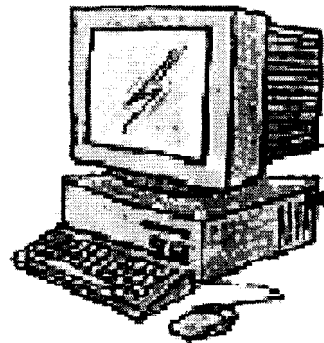
V.18 An automoding modem

- a bridge to mono media text

Can be used in gateways and servers

Example of use

V.18-terminal



Baudot

USA, UK

Bell

USA

DTMF

Holland

EDT

Germany

Minitel

France

V.18

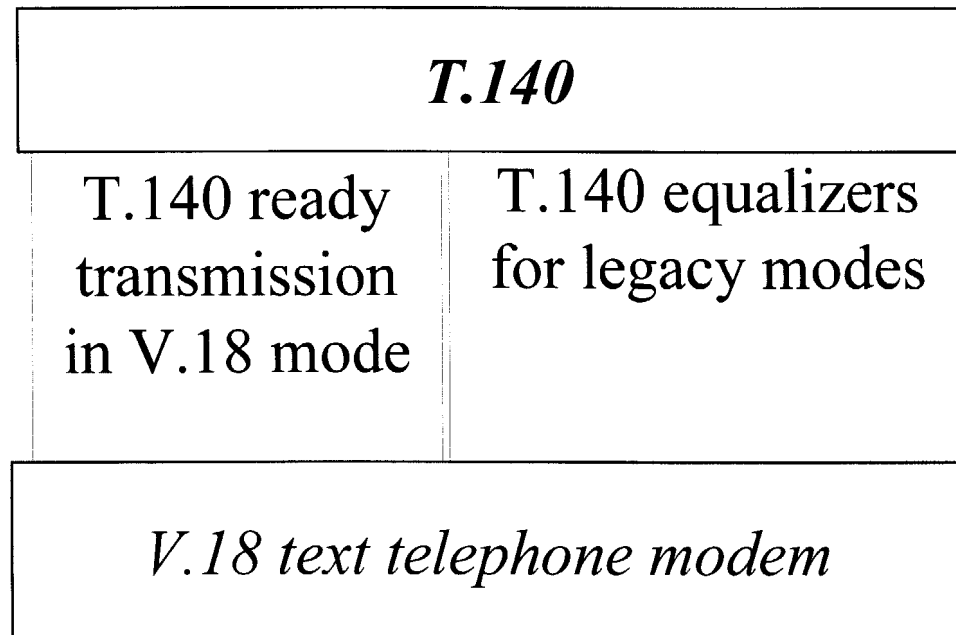
Anywhere

V.21

Sweden, UK

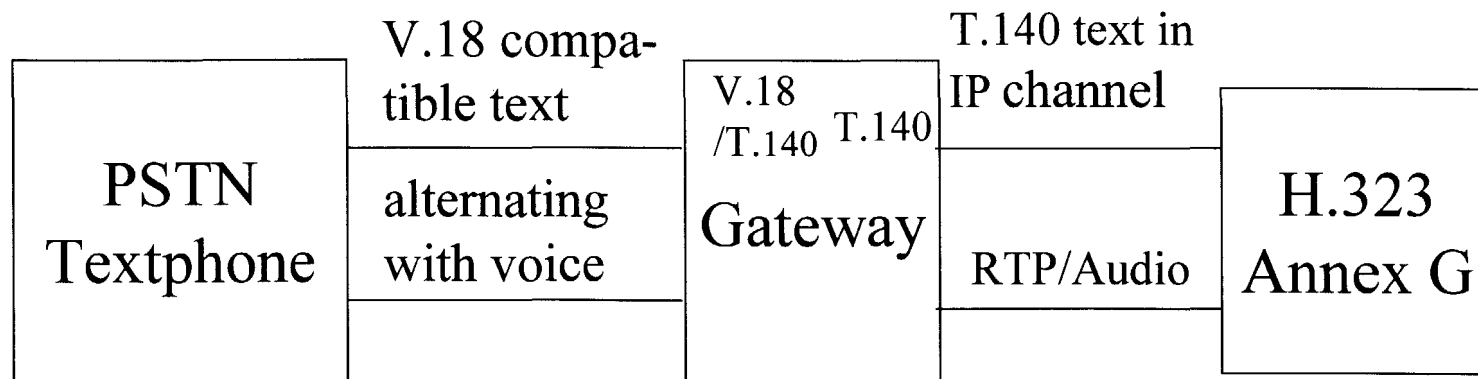
Text telephone interworking

- T.140 is also used in standardised text telephony.
- V.18 enables communication with a huge number of existing text telephones



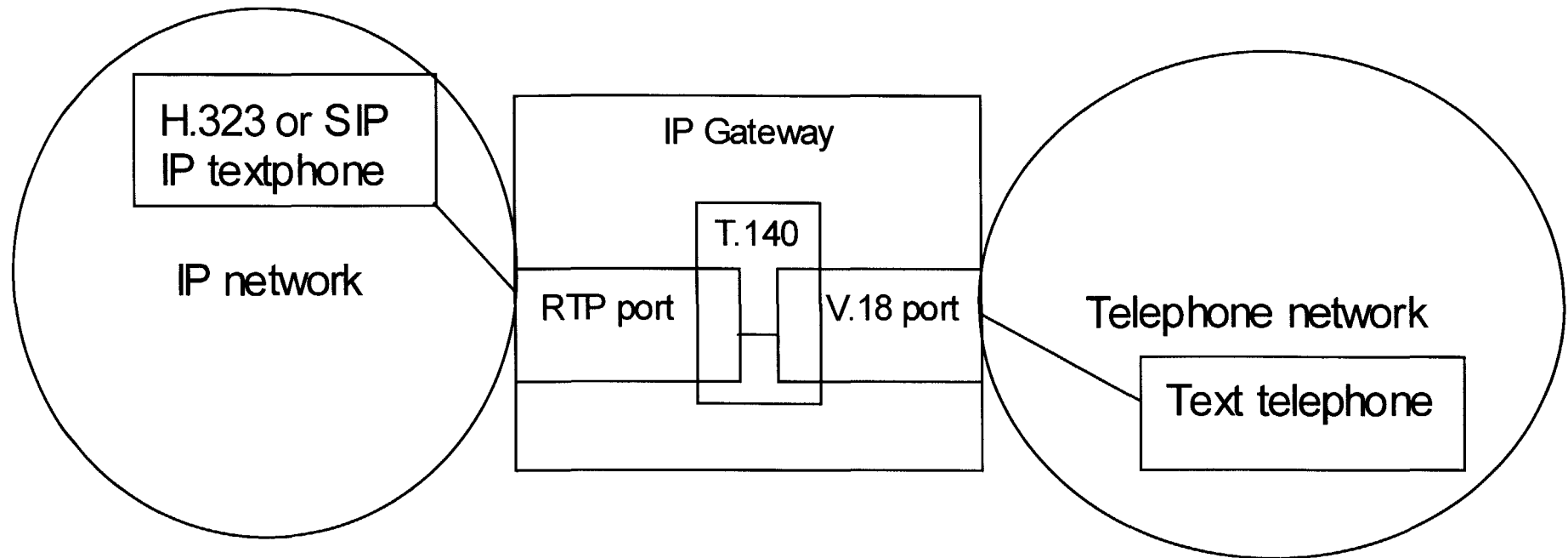
PSTN Interworking

- Gateways need to have V.18 capabilities, to connect PSTN text telephone calls with Total Conversation or IP Text Telephone terminals
- Gateways need to be T.140 aware



Gateway example V.18 - H.323

Textphone gateway call between Telephone network and IP network



Textphone call in telephone network passing through IP network

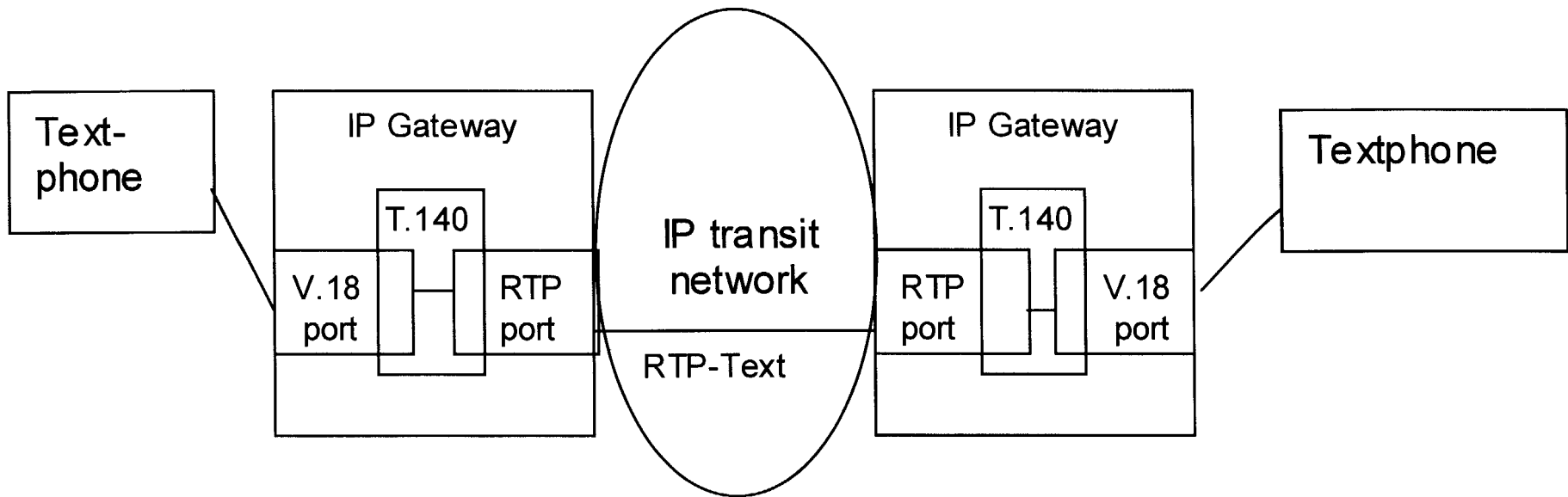


Figure: IP transit network in textphone call

IP gateway standardisation

ITU-T H.248 and IETF Megaco

- Current hot topic – huge efforts.
- Text telephone and text conversation additions well timed
- Need for integration of text – fax – modem additions
- Ideal view – same port for voice, text, fax and modem, automatic identification of mode and invocation of proper packetization.
- Gallaudet University put in efforts now on text integration – important period to Feb. 2000.

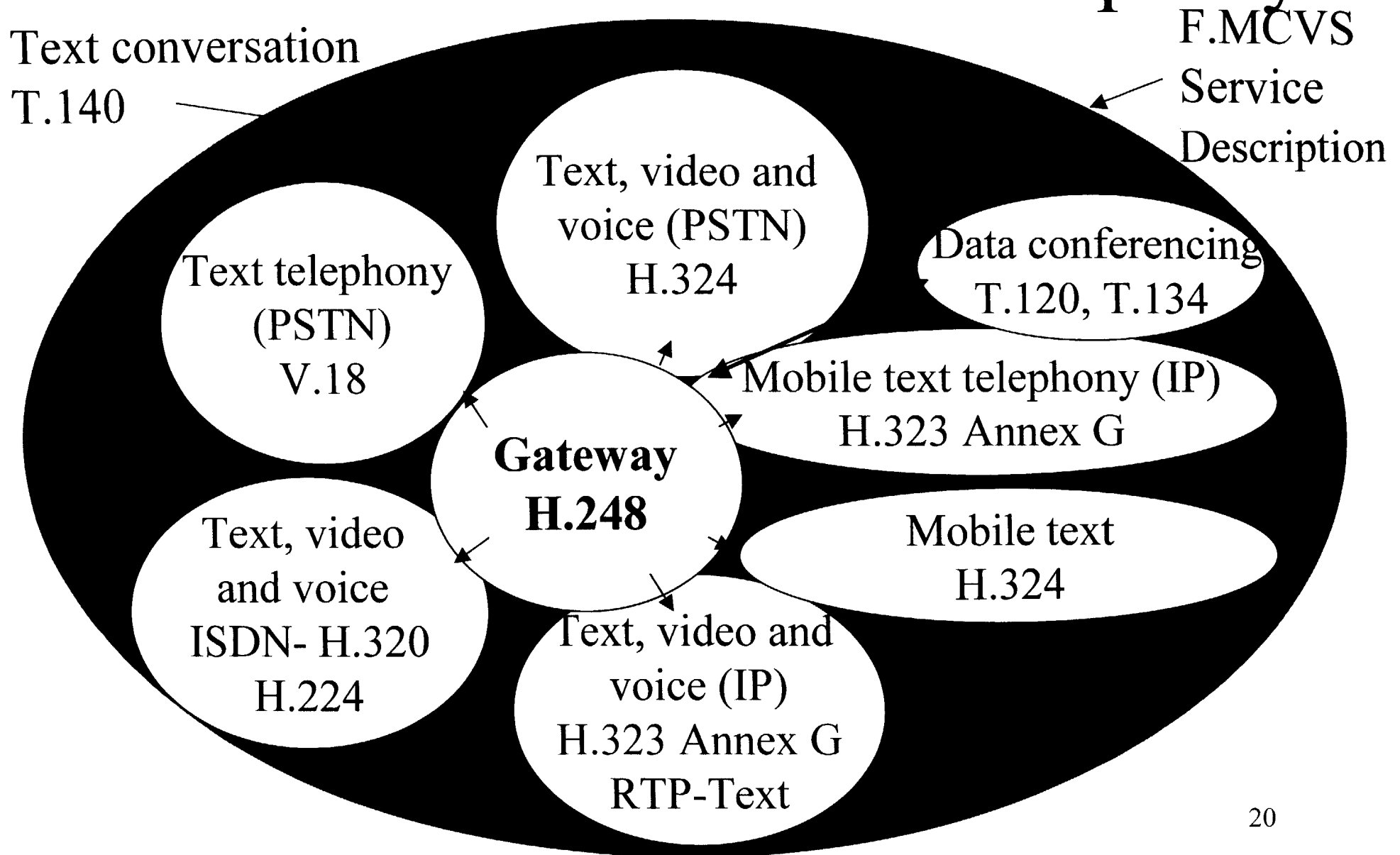
Mobile interworking

- Another hot topic is Mobile networks
- Total conversation also covers mobiles
- Interworking with text telephones can be made through the H.248 gateway additions for text
- Important to treat both mobile and IP interworking in parallel

Conclusions

- Video telephony is complemented with text to form Total Conversation
- Text Telephony is linked in through a standardised bridge – V.18
- Work is centered in ITU-T SG 16 with Q9-Accessibility as initiator
- Many companies and organisation have contributed
- Standards are nearly in place, implementations can begin

Standards support for Total Conversation and text telephony



Demonstration

- Standardised IP text telephony implemented in standardisation work for Ericsson
- T.140 and RTP-Text transmission demo application
- Attached to Microsoft Netmeeting H.323 IP telephony base system
- Limitations: Not full implementation of H.323 Annex G.
- Intention – demonstrate usability of the standards

ATTACHMENT C

**TEXT TELEPHONY AND TOTAL CONVERSATION
IN THE IP REVOLUTION**

GUNNAR HELLSTRÖM

Omnitor

Rapporteur in ITU-T SG16

Q9 Accessibility to Multimedia

Total Conversation and Text Telephony in the IP revolution.

*Presentation to the VON coalition meeting with Accessibility Actors and the FCC.
Monday, December 13, 1999, Washington DC*

By

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Rapporteur in ITU-T Q9/16 Accessibility to Multimedia Systems and Services.

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Summary

Telecom services are rapidly going through an IP revolution. More and more services get IP based by adopting Internet Protocols or being provided in the Internet. This change imposes opportunities and risks for the users.

This document clarifies how recently developed telecom standards can contribute to better accessibility to conversational telecom services including Text Telephony. By introducing standards for text conversation, text can be combined with video and voice. Important opportunities are opened. The combination is called Total Conversation. The document explains the situation in standardisation of text conversation functions. Most components are ready or near to be approved in international standardisation, while the important gateway work, needed to bridge between different networks is still in the middle of intensive work. Of special importance is the provision of methods for interworking with text telephony in the telephone network.

Many companies and organisations contribute to the standardisation of accessible telecommunications, co-ordinated from the working group ITU-T Q9/16 "Accessibility to Multimedia".

IP Telephony offers accessibility improvements

The growth of IP Telephony offers an opportunity to implement more accessible telecommunication services while preserving compatibility with the old.

If any new technology is to be accepted by the users of text conversation, it should enable contacts with the current users of text telephony. For a great number of people with hearing impairment, deafness, deaf-blindness and speech impairments, the current TTY and other text

telephones are important tools for distant personal conversations. Communication with newer systems could be established preserving interworking with the old.

Interworking is always arranged between voice telephones in different networks. The ambition behind the standardisation activities for text conversation is to make that possible also for text.

When defining standards for IP Text Conversation, it is important to base the work on the most dominating standards for IP Telephony and IP Multimedia, so that products of general interest with accessibility features can be designed.

In IP based networks, it is easy to establish simultaneous communication in text, video and voice in any combination. That can open conversational services for a large number of users who do not find today's TTY:s to be a suitable alternative for communication and therefore do not benefit from telecomm services today.

The first step - standardisation of Total Conversation

Text Telephony can be seen as a limited special case of multimedia conversation.

There are recommendations developed now, defining the concept of Total Conversation as an extension of Video Telephony, including video, *text* and voice. It is possible to select only one or two of these media in an implementation. An example can be an IP Text Telephone only implementing text and voice, allowing truly simultaneous text and voice operation.

It is important to have standardised solutions for Total Conversation in all networks, including IP networks as well as Mobile networks, ISDN and the telephone network.

The combination of video, text and voice, offers a great increase in usability in personal conversation, because the users can use a combination of modes that suit the situation for the moment.

One example could be a hearing impaired person who can perceive a conversation quite well with the combination of voice and good video for lip-reading but occasionally need to revert to getting something typed in the text part of the conversation.

Another example may be in video relay services. Interpreters working in video relays with plain videophones say that the text addition would be essential for the efficiency of the service for conveying the telephone number from the user. That task is tedious without the text capability.

Total Conversation can be extended by local adaptations. It can be deaf-blind people needing text output through a screen reader, it can be adult deaf people who may be eager to use automatic voice-to-text translation to make communication convenient.

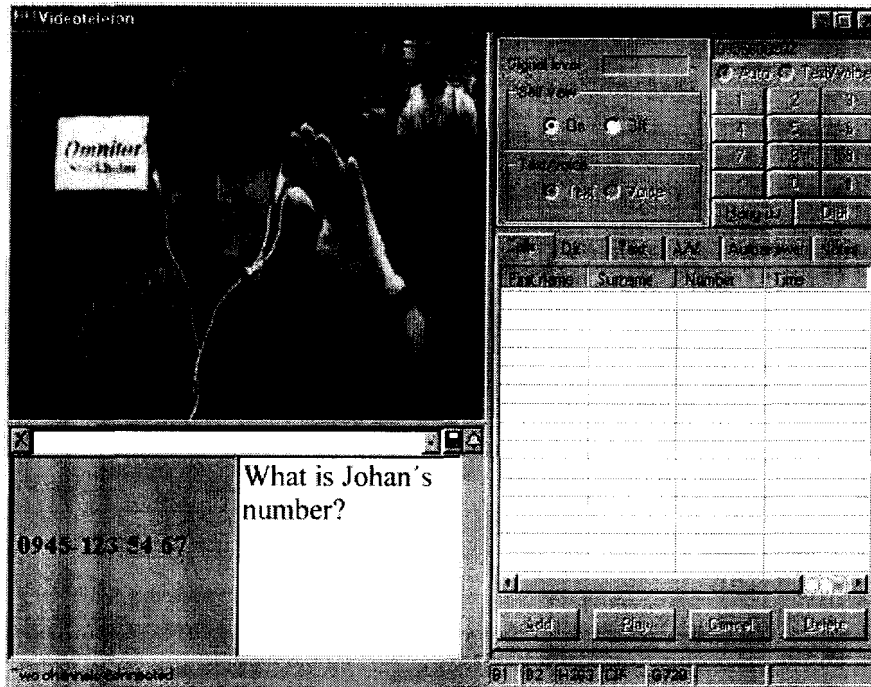


Figure: Example of a Total Conversation terminal for video, text and voice.

Standardise in powerful organisations

The work with standardisation of Total Conversation is handled both in ITU-T and IETF.

ITU-T is the International Telecommunications Union. It has settled most standards for video telephony, voice telephony, fax, modem and text telephony that are in common use now.

IETF is the Internet Engineering Task Force, and it manages standards to be used in IP networks.

These two organisations dominate international standardisation in telecommunications and the Internet. Since they created the dominating basic standards environments where text conversation is needed, they form the natural place for the additions creating Total Conversation.

International standards act as catalysers on implementations. It attracts efforts from industry and usage from customers, thus accelerating the benefit for all involved parties. It is a good habit of the industry to *unite* in creating standards for communication methods and *compete* in creating the smartest implementations of the standards.

T.140, the standardised text addition to multimedia systems

When text is transmitted in the Total Conversation environment, it is coded as text in the internationally dominating Unicode code, with a robust transformation called UTF-8. This is the prevailing code for most new text oriented services. The application of this code in text conversation is specified in Recommendation ITU-T T.140. It specifies that text shall be transmitted character by character or in small chunks, to give the best conversational flow, just like today's text telephones.

Each network environment have its own data transport mechanisms, and it must therefore be specified how T.140 codes are to be transmitted in each environment.

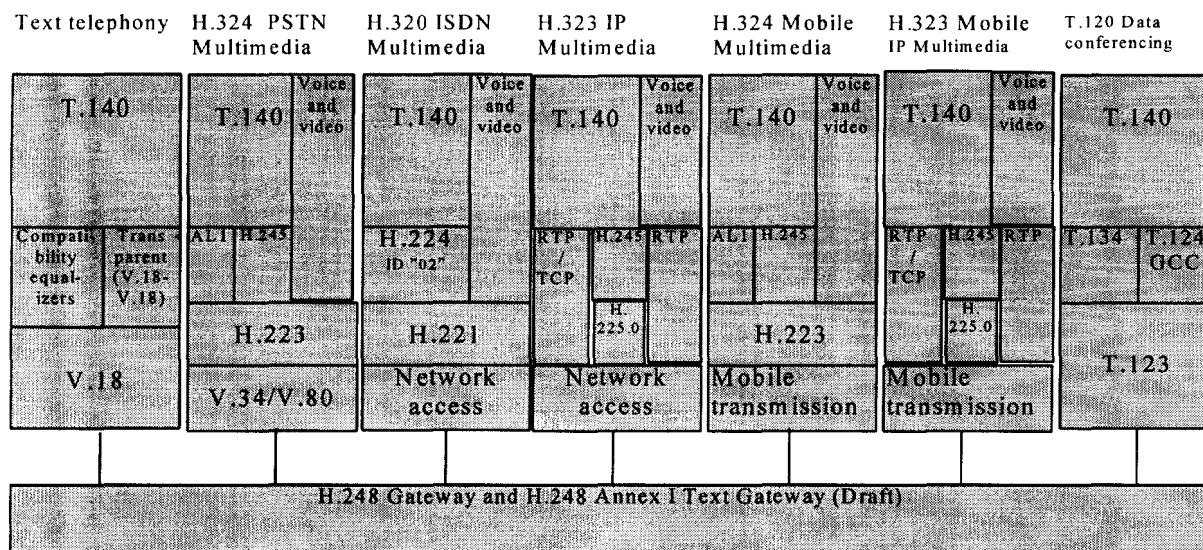


Figure: The Total Conversation standard family (note, not all approved yet)

IP Text Telephony in line with IP Telephony

The recommendations for Total Conversation in IP networks are based on the same protocols as the IP Telephony protocols. IP Total Conversation is a superset of IP Telephony. Therefore, in this era of growing support for IP Telephony, Total Conversation offers the opportunity to create accessibility in a universal way.

Addition to H.323 multimedia communication in ITU

The currently prevailing standard for IP telephony and IP Multimedia is ITU-T H.323. In order to expand H.323 to also include text conversation and a simple text telephone is specified as "H.323 Annex G Text Conversation and Text SET". The strategy is to let text transmission follow the same method as audio and video. A channel is established for each medium directly between the endpoints involved in a call. By this strategy, the from video phone to "total phone" and from IP telephone to IP textphone will be smooth. Inclusion in gateways and services will not be hindered by any major technical obstacles.

Transmission method standardised in IETF

In order to establish the IP text conversation standard, a transmission protocol was needed for T.140 in the IP environment. Both Audio and video make use of a protocol from IETF called RTP. A specific RTP payload description was specified for T.140 data including optional use of a redundancy mechanism in order to decrease risk of loss of text. Data loss is always a risk in IP networks, and different mechanisms are applied to keep the risk low. The RTP payload specification for text is in the process of being approved. It has been implemented and proven to function well. An application is also issued for registration of this T.140 text transport as a MIME registered medium. That makes it possible to use T.140 in other IP applications and protocols.

Next multimedia protocol “SIP” in IP networks is “text ready”

A second Multimedia protocol to be used in IP telephony and IP Multimedia communication is the IETF Session Initiation Protocol, SIP. It is not yet as well established as H.323, but used in some implementations. By specifying a text transmission for text in RTP, and registering it as a MIME medium, it will be ready for inclusion in SIP implementations without further standardisation. Thereby SIP is “text ready”. SIP and H.323 are expected to live side by side in the IP networks, with gateways or multifunction protocols securing interworking between them.

Gateway needs

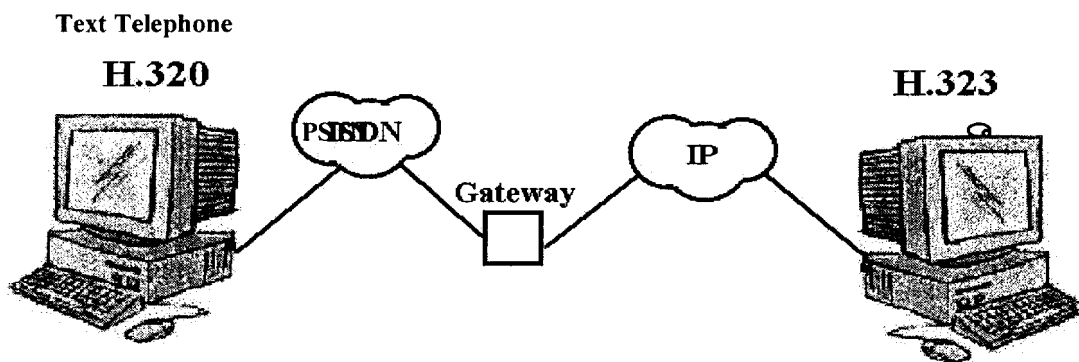


Figure: Example of use of a Gateway.

For the described evolution to take place, compatibility need to be established with corresponding services in IP networks, in the telephone network and mobile networks. The main services to take into consideration are text telephony and voice telephony. While the main current emphasis is on voice telephony, there are movements to also specify interworking between text telephony (TTY) in telephone networks and IP Text Telephony.

Compatibility is arranged by describing Text Conversation and Text Telephony additions to the standards for IP gateways. This work is just now taking place in the ITU and IETF. The accessibility additions are made in phase with other definitions of gateway functions. The work is done under the name of H.248 Annex I in ITU-T Study Group 16 and in the Megaco working group in the IETF.

The user requirements were specified in IETF. The text telephone compatibility requirements specify different ambition levels for the support:

Gateway requirements

The following text is directly fetched from IETF Megaco requirements.

"11.2.4. Trunking/Access Gateway with text telephone access ports

An access gateway with ports capable of text telephone communication, must provide communication between text telephones in the SCN and text conversation channels in the packet network.

Text telephone capability of ports is assumed to be possible to combine with other options for calls as described in section 11.2.6 (e.) on "Adaptable NASes".

The port is assumed to adjust for the differences in the supported text telephone protocols, so that the text media stream can be communicated T.140 coded in the packet network without further transcoding [7].

The protocol must be capable of reporting the type of text telephone that is connected to the SCN port. The foreseen types are the same as the ones supported by ITU-T V.18: DTMF, EDT, Baudot-45, Baudot-50, Bell, V.21, Minitel and V.18. It should be possible to control which protocols are supported. The SCN port is assumed to contain ITU-T V.18 functionality [8].

The protocol must be able to control the following functionality levels of text telephone support:

- a. Simple text-only support: The call is set into text mode from the beginning of the call, in order to conduct a text-only conversation.
- b. Alternating text-voice support: The call may begin in voice mode or text mode and, at any moment during the call, change mode on request by the SCN user. On the packet side, the two media streams for voice and text must be opened, and it must be possible to control the feeding of each stream by the protocol.
- c. Simultaneous text and voice support: The call is performed in a mode when simultaneous text and voice streams are supported. The call may start in voice mode and during the call change state to a text-and-voice call.

A port may implement only level a, or any level combination of a, b and c, always including level a.

The protocol must support:

- d. A text based alternative to the interactive voice response, or audio resource functionality of the gateway when the port is used in text telephone mode.
- e. Selection of what national translation table to be used between the Unicode based T.140 and the 5-7 bit based text telephone protocols.
- f. Control of the V.18 probe message to be used on incoming calls."

The international text telephone standard V.18 – a prerequisite for a gateway specification.

The gateways need to support conversion between the tone coded text telephone methods used in the telephone network and the T.140 data coding of text used in the IP network. How that can be done is described in the gateway work in the standards groups.

An important prerequisite for that work was to have the international text telephone standard V.18 to refer to in the work. It is now possible to name text telephone support with one term “V.18” in overviews, and leave the details for the technical specifications.

ITU-T V.18 is backwards compatible with all textphone methods. It can be used in gateways and form a bridge to the digital world.

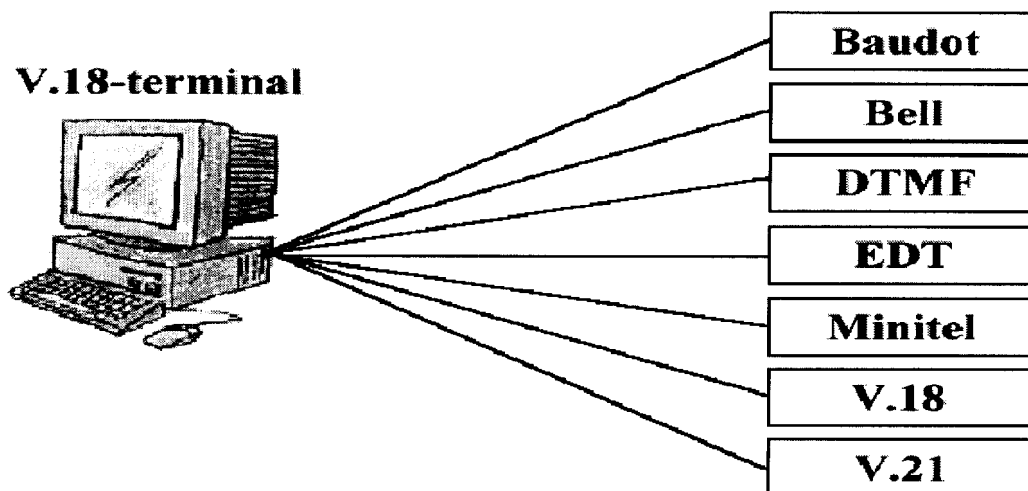


Figure: A V.18 equipped text phone or gateway can communicate with all types of textphones.

A need to integrate with fax and modem gateway specifications

Also fax, modem and voice traffic have the same need as text phone traffic to go through IP networks or end in IP networks. For proper handling of these four uses of the telephone network, an integrated specification must be created. Work has started, and the main part of that work should be ready in February 2000, in the form of a joint draft Annex to the H.248 gateway protocol specification.

Without text gateways - no guarantee of text transmission.

If the text telephone gateways are not implemented, there is no guarantee that TTY tones will be carried well as audio coded information by the gateways. That is one additional reason why the Total Conversation concept is preferable to apply, with gateways identifying TTY connections and converting between TTY tones and Text Conversation data codes.

The gateways will be used in two ways, as gateways between different networks, and to create a transit path through IP networks for telephone network users.

If the ports to the telephone network were provided with V.18 capabilities to be able to detect and decode text telephone traffic, and T.140 was used as the common text protocol on the IP side transported on RTP or TCP, text telephone calls could flow both between telephone network users and between the network types.

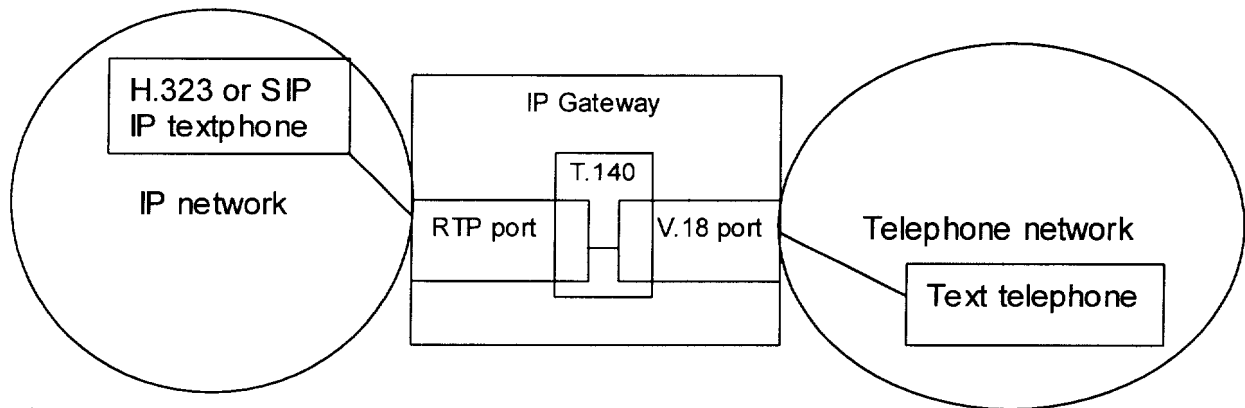


Figure: Gateway connecting IP Textphone with telephone network textphone

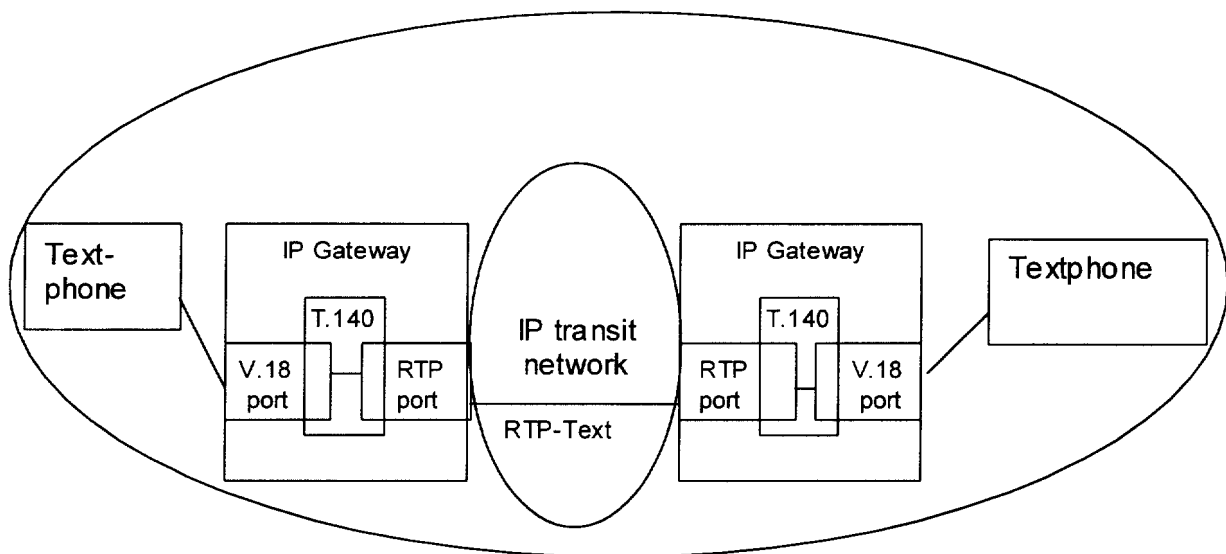


Figure: IP transit network in textphone call

Mobile networks

IP networks are not the only new network to consider. The next generation mobile networks are just emerging. They can support multimedia conversation. The Total Conversation standards are made so, that they can be applied also in these mobile networks. The work with gateways are valid also for entry to mobile networks, and by applying the same architecture with T.140 as the common protocol, interworking can be achieved.

Industry efforts

The industry now makes efforts to finalize the Total Conversation concept and the standardise the gateway between text telephony (TTY) and IP Total Conversation. It should be remembered that standardisation and implementation in operational services are separate processes. Approved Recommendations for Total Conversation support in IP networks are important prerequisites for smoothly interworking services.

Many companies and organisations are contributing to the standardisation process.

Gunnar Hellström from Omnitor, Sweden has co-ordinated it from 1997-2000 as Rapporteur for ITU-T Q9/16 Accessibility to Multimedia Systems and Services, first on behalf of the Swedish Post and Telecom Agency and later on behalf of LM Ericsson.

Conclusion

The emerging Total Conversation concept adds text conversation to all major multimedia conversation standards. The addition is made in a way that is intended for smooth implementation. One common presentation level, ITU-T T.140 is used, based on the internationally useful Unicode standard.

Any combination of text, video and voice can be implemented and terminals implementing different subsets can communicate in common modes.

It is therefore possible to create IP text telephones.

Interworking with the current text telephones can be accomplished through standardised gateways that also can be involved for cases when the IP network is just used as a transit network.

Suitable standards and standard proposals exist. Total Conversation can be implemented to serve the text telephone users in new networks.

Standardisation summary.

This is a list of standards and drafts related to Total Conversation and Text Telephony.

1. ITU-T V.18, approved 1994, amended 1998. Text telephone modem Recommendation, with automoding to Baudot, DTMF, EDT, V.21, Bell, Minitel and V.18, also used in the gateway work as a bridge to IP text conversation. Requires use of T.140 between V.18 terminals.
2. ITU-T T.140, approved 1998, amended 1999. Common text conversation presentation level, based on Unicode UTF-8. Makes it simple to establish character by character text conversation with interworking in a new environment.
3. ITU-T T.134, approved 1998. Transport of T.140 in T.120 data conferencing environment.
4. ITU-T modification to H.324 to include transport of T.140 in circuit switched multimedia calls. Decided 1998. Can be used for Mobile Text Conversation.

5. ITU-T H.224, revision, for decision in feb. 2000. Transport of T.140 in ISDN H.320 Multimedia is enabled by allocating Client Id=2.
6. ITU-T H.323 Annex G, Text conversation and text SET, for decision in Feb. 2000. Transport of T.140 in IP telephony and IP Multimedia conversation.
7. IETF RTP-payload for text conversation. Last call 1999-12-08. Intended to be RFC before end of 1999. Transport mechanism for T.140 to be used in H.323 and SIP.
8. IETF Megaco requirements 09. IP gateway requirements including text telephone gateway requirements. Last call 1999-12-10. Planned to be RFC before end of 1999.
9. H.248 Annex I. Text conversation and Text telephony packages. Additions to the gateway protocol specification H.248 for text telephony and text conversation. Draft, to be integrated with fax and modem specifications before Feb- 2000.
10. IETF Megaco packages. The text packages for H.248 gateway combined with other packages in a common package draft specification in IETF. Should be developed in parallel with H.248 Annex I.
11. ITU-T F.MVCS Service description: Multimedia Conversation Services. Draft, including text telephony and Total Conversation.
12. Modifications and additions for Total Conversation and text telephony are made to:
H.245: Multimedia control for management of T.140 channels,
V.8: Modem Handshake for defining V.18 text telephone call function,
V.8 bis Modem handshake to select modulation and simultaneous text and voice for text telephony and telephone network multimedia,
V.250 DCE control language to control a V.18 modem,
Q.931 Connection procedures to define selection of a V.18 modem,
T.120 data conferencing to add the Text Conversation application T.134 to the T.120 family.
13. ITU-T H-series supplement 1: Application profile for sign language and lip reading use of low bitrate video communication.(in preparation for publication). Full Total Conversation should also explore the potential of communicating in video with sufficient quality for sign language and lip reading. This document give some guidance.

Mail list and links

Text telephony and Total Conversation with special focus on standardisation aspects is discussed in the mail list textphone@lsv.pi.se

Membership is achieved by mailing an e-mail to listserv@lsv.pi.se with no subject and one line message saying

Subscribe textphone /your name/

(Replace /your name/ with your name.)

The ITU Work can be followed through www.itu.int Standards SG16.

The IETF work can be followed through www.ietf.org working groups “avt” and “megaco”.